

# PATENT SPECIFICATION

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DRAWINGS ATTACHED

- (21) Application No. 8707/71 (22) Filed 5 April 1971  
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## (54) IMPROVEMENTS IN OR RELATING TO EAR DEFENDER HEAD SETS

- (71) We, S. G. BROWN LIMITED, a British Company, of Greycaines Estate, North Watford, Hertfordshire and THOMAS DENIS IBBOTSON, a British Subject, of S. G. Brown Limited, Greycaines Estate, North Watford, Hertfordshire, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—
- This invention relates to ear defender head sets, i.e. a head set having, for each ear, an ear-piece preventing the wearer from hearing ambient noise and having, for one or more usually for each ear, an electro-acoustical transducer in the ear-piece converting electrical signals into audible signals e.g. speech signals.
- Ear defender head sets are used for example in conditions of high ambient noise level such as aircraft engine test beds. They may form part of protective clothing, for example part of a helmet and for this reason, it may not be permissible or practicable to remove the head set at times when the ambient noise level is low; the wearer therefore, even in low ambient noise conditions, cannot hear normal speech or other sounds which would be audible to anyone without the ear defender head set. To enable the wearer to hear external sounds it has been proposed heretofore to provide a rotary valve or a hinged door or plug for an aperture in the earpiece structure or to provide an external microphone connected electrically to a transducer within the earpiece.
- It is one of the objects of the present invention to provide an improved form of ear defender head set enabling the wearer, when de-
- against the head of the wearer when in use and thereby prevent ambient noise entering the ear of the wearer between the housing and the head, said housing comprising two parts normally held together by spring force and having control means on one of the parts movable to separate the parts against the spring force so as to open the housing to the ambient atmosphere to admit external sound waves into the housing. With this construction the wearer of the head set has control means operable when required to provide an opening connecting the air space within the housing to the external atmosphere thus enabling the wearer to hear external sounds. Such control means may be provided on one or both ear-pieces of the head set.
- In one convenient form of construction, the two part operable housing comprises a base portion and a separate annular member surrounding said aperture and carrying the padding, and spring means are provided normally holding the annular member tightly against the base portion and said control means comprises an operating member arranged for moving the annular member away from the base portion against the spring bias. The operating member may comprise a movable element forming a cam and mounted on one part of the housing for bearing against the other part of the housing or it may comprise an element movably mounted on one part, preferably the base portion, and co-operating with a cam surface on the other part. Conveniently said operating member is mounted for angular movement.
- Since the housing, to form an effective ear defender, must be tightly sealed against external sounds, preferably the movable element is

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Inventor: THOMAS DENIS IBBOTSON

By a direction given under Section 17 (1) of the Patents Act 1949 this application proceeded in the name of S.G.BROWN COMMUNICATIONS LIMITED of Amplivox House, Beresford Avenue, Wembley, Middlesex, a British Company.

THE PATENT OFFICE

R 16499/6

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This invention relates to ear defender head sets, i.e. a head set having, for each ear, an ear-piece preventing the wearer from hearing ambient noise and having, for one or more usually for each ear, an electro-acoustical transducer in the ear-piece converting electrical signals into audible signals e.g. speech signals.

Ear defender head sets are used for example in conditions of high ambient noise level such as aircraft engine test beds. They may form part of protective clothing, for example part of a helmet and for this reason, it may not be permissible or practicable to remove the head set at times when the ambient noise level is low; the wearer therefore, even in low ambient noise conditions, cannot hear normal speech or other sounds which would be audible to anyone without the ear defender head set. To enable the wearer to hear external sounds it has been proposed heretofore to provide a rotary valve or a hinged door or plug for an aperture in the earpiece structure or to provide an external microphone connected electrically to a transducer within the earpiece.

It is one of the objects of the present invention to provide an improved form of ear defender head set enabling the wearer, when desired, to "listen out" that is to hear external sounds.

According to the present invention, an ear defender head set has, for one or for each ear, an electro-acoustical transducer mounted within a housing having an aperture for placing adjacent the ear, said housing carrying padding around the aperture for sealing the housing

against the head of the wearer when in use and thereby prevent ambient noise entering the ear of the wearer between the housing and the head, said housing comprising two parts normally held together by spring force and having control means on one of the parts movable to separate the parts against the spring force so as to open the housing to the ambient atmosphere to admit external sound waves into the housing. With this construction the wearer of the head set has control means operable when required to provide an opening connecting the air space within the housing to the external atmosphere thus enabling the wearer to hear external sounds. Such control means may be provided on one or both ear-pieces of the head set.

In one convenient form of construction, the two part operable housing comprises a base portion and a separate annular member surrounding said aperture and carrying the padding, and spring means are provided normally holding the annular member tightly against the base portion and said control means comprises an operating member arranged for moving the annular member away from the base portion against the spring bias. The operating member may comprise a movable element forming a cam and mounted on one part of the housing for bearing against the other part of the housing or it may comprise an element movably mounted on one part, preferably the base portion, and co-operating with a cam surface on the other part. Conveniently said operating member is mounted for angular movement.

Since the housing, to form an effective ear defender, must be tightly sealed against external sounds, preferably the movable element is mounted on the outer face of said base portion and co-operates with an external surface on the annular member. In a preferred form of construction, the annular member has a short length of dependent flange lying close to but outside the wall of the base portion and forming a cam surface and the aforementioned movable element is pivotally mounted exter-

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nally on the base portion to bear against the cam surface and to move along the cam surface as the movable element is swung about its pivot.

5 The annular member and the base portion preferably have a seal between them, for example an annular pad on one bearing against the mating surface on the other so as to form a tight seal when the annular member and base portion are in contact.

10 The following is a description of one embodiment of the invention reference being made to the accompanying drawings in which:—

15 Figure 1 is a front view of one ear-piece of an ear defender head set;

Figure 2 is a rear view of the ear-piece of Figure 1:

Figure 3 is an end elevation; and

20 Figure 4 is a cross section along the line 4—4 of Figure 1.

Referring to the drawings, there is shown an ear-piece of an ear defender head set comprising a two-part housing having a base portion 10 of generally cup-shaped form open across its front face and formed of rigid plastics material and an annular portion 11, also of rigid plastics material, which seats across the open face of the base portion 10. A soft foam annular element 12 forms a seal between the portions 10, 11.

The annular portion 11 on its front face has a central aperture, referred to as the ear aperture, which aperture is surrounded by soft padding 13. In this particular embodiment, the padding 13 is in the form of an air cushion and it can thus readily take up a shape conforming to the shape of the head and ear of the wearer when the ear-piece is put over the ear. Ear defender head sets having padding to form a seal preventing external sounds entering the ear of the wearer between the ear-piece and the head are known and the construction of the padding will not therefore be further described.

45 Within the housing comprised by the portions 10, 11 is an electro-acoustical transducer 14 for converting electrical signals into audible signals, which transducer is mounted on a plate 15 secured in the base portion 10 by bolts 16. In this particular embodiment the transducer 14 is held down against a foam pad 17 which bears against the plate 15, the transducer being held down by a metal cup-shaped element 18 having an outwardly directed flange 19 through which the aforementioned bolts 16 pass and which is sandwiched between the plate 15 and part of the base portion 10. Padding 20 is provided between the elements 18 (which has a central aperture 21) and the transducer 14. The transducers 14 is thus held in the base portion 10 of the housing but is spaced away from the ear aperture in the annular portion 11.

65 The annular portion 11 is held down onto

the base portion 10 by means of a flexible helical spring 22 which passes over a hook shaped bracket 23 secured to the portion 11, the two ends of the spring being hooked respectively on two lugs 24 bolted to the base portion 10.

70 A lever 30 is pivotally mounted on a bolt 31 in the plate 15 and extends upwardly closely adjacent the external surface of the base portion 10 of the housing to a point adjacent the annular portion 11. The lever 30 has an outwardly extending end portion 32 forming an operating handle. The inner end of this portion 32 bears against the underside of a flange element 33 which is secured on the annular portion 11 and which is shaped, as most clearly seen in Figure 3, to form a cam surface. The lever 30 can be swung between a first position, shown in chain lines in Figures 2 and 3, to a second position shown in full lines in Figures 2 and 3. The lever 30 adjacent its pivot is recessed in the plate 15 (as is seen in Figures 2 and 4), the recess 34 being formed with shoulders 35 as shown in Figure 2 to form stops limiting the angular travel of the lever. In the position of the lever 30 shown in full lines in Figures 2 and 3, the cam surface forces the annular portion 11 upwardly at one end of the ear-piece, breaking the seal between the base portion 10 and the resilient soft foam element 12 on the annular portion 11 and thereby opening the region within the housing to the ambient atmosphere. When the lever is moved to the chain line position however, the spring 22 pulls down the annular portion 11 so that it is tightly sealed by the element 12 against the base portion 10 thereby preventing any outside sound entering the housing and being heard by the wearer.

100 In an ear defender head set there are two ear-pieces and preferably each has a control lever 30 so that each ear-piece can be opened to the ambient atmosphere. It will thus be seen that if a wearer of the head set puts the lever 30 on one or both ear-pieces into the second (full line) position, he can listen to external sounds. By putting the lever in the first (chain line) position, the head set then functions as an ear defender head set. Operation of the lever 30 does not in any way affect the operation of the transducer 14 or interfere with hearing sound signals from the transducer.

#### WHAT WE CLAIM IS:—

1. An ear defender head set having, for one or for each ear, an electro-acoustical transducer mounted within a housing having an aperture for placing adjacent the ear, said housing carrying padding around the aperture for sealing the housing against the head of a wearer when in use and thereby to prevent ambient noise entering the ear of the wearer between the housing and the head, said housing comprising two parts normally held together by spring force and having control 130

means on one of the parts movable to separate the parts against the spring force so as to open the housing to the ambient atmosphere to admit external sound waves to the housing.

- 5 2. An ear defender head set as claimed in claim 1 wherein the two-part housing comprises a base portion and a separate annular member surrounding said aperture and carrying the padding and wherein spring means are provided normally holding the annular member tightly against the base portion and wherein said control means comprises an operating member arranged for moving the annular member away from the base portion against the spring bias.

- 15 3. An ear defender head set as claimed in claim 2 wherein said operating member comprises a movable element forming a cam and mounted on one part of the housing for bearing against the other part of the housing.

- 20 4. An ear defender head set as claimed in claim 2 wherein said operating member comprises an element movably mounted on one part and co-operating with a cam surface on the other part of the housing.

- 25 5. An ear defender head set as claimed in claim 4 wherein said element is mounted on the base portion of the housing.

- 30 6. An ear defender head set as claimed in any of claims 2 to 5 wherein said operating member is mounted for angular movement.

7. An ear defender head set as claimed in claim 5 wherein said movable element is

mounted on the outer face of said base portion and co-operates with an external surface of said annular member. 35

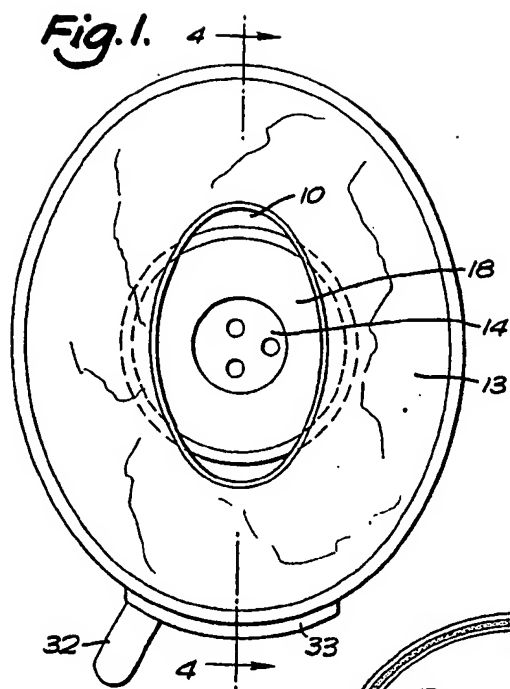
8. An ear defender head set as claimed in claim 7 wherein said annular member has a short length of dependant flange lying close to but outside the wall of the base portion and forming a cam surface and wherein said movable element is pivotally mounted externally on the base portion to bear against the cam surface and to move along with the cam surface as the movable element is swung around its pivot. 40 45

9. An ear defender head set as claimed in claim 8 wherein said movable element is a metal strip.

10. An ear defender head set as claimed in either claim 8 or claim 9 wherein a seal is provided between the annular member and the base portion to seal the housing when the annular member is held by the spring means against the base portion. 50 55

11. An ear defender head set substantially as hereinbefore described with reference to the accompanying drawings.

BOULT, WADE & TENNANT 60  
Chartered Patent Agents  
34 Cursitor Street  
London, EC4A 1PQ.  
Agents for the Applicants



**Fig. 2.**

